Science Council of British Columbia

Seventh Annual Report 1984-85

Secretariat on Science,
Research and Development

85-5834/

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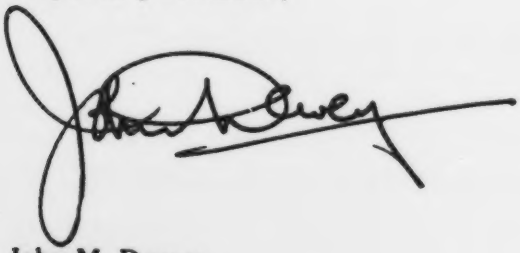
June 30, 1985

The Honourable Patrick L. McGeer,
Minister of Universities,
Science and Communications,
Province of British Columbia,
Parliament Buildings,
VICTORIA, B.C.
V8V 1X4

Dear Dr. McGeer;

I have the honour to present to you the Seventh Annual Report of the Science Council of British Columbia, and of the Secretariat on Science, Research and Development, for the year ended March 31, 1985.

Respectfully submitted,



John M. Dewey,
Chairman,
Science Council of British Columbia

Members

MEMBER	DATE OF APPOINTMENT	CURRENT TERM EXPIRES
Dr. R.A. Nodwell Vice-President, TIR Systems Limited, Vancouver	July 15, 1981 (Chairman to March 14, 1985)	Resigned March 14, 1985
Dr. John M. Dewey Associate Vice-President Academic for Research, University of Victoria	February 13, 1985 (Chairman from March 14, 1985)	February 13, 1987
Dr. W.M. Armstrong Retired, Vancouver	January 29, 1982	Honorary Member
Mr. G.S. Balcom President, Harmattan International Consulting Ltd., Vancouver	March 24, 1983	March 24, 1985
Dr. J.F. Cochran Dean of Science, Simon Fraser University	July 30, 1981	July 30, 1984
Dr. D.J. Connor Vice President, Corporate Development, MacDonald Dettwiler and Associates Richmond	February 20, 1985	February 20, 1987
Dr. D.H. Copp Department of Physiology, University of British Columbia	January 30, 1981	March 14, 1987
Mr. K.A. French President, Fortntek Canada Corporation, Vancouver	February 23, 1984	February 23, 1986
Dr. D.A. George Dean of Engineering Science, Simon Fraser University	July 28, 1983	July 28, 1985
Mr. Bryon Hodges President, Windsor Machine Company Burnaby	June 13, 1984	June 13, 1986

Members

MEMBER	DATE OF APPOINTMENT	CURRENT TERM EXPIRES
Dr. T.E. Howard Executive Director, B.C. Research Vancouver	July 26, 1984	July 25, 1986
Dr. P.A. Larkin Associate Vice-President, (Research), University of British Columbia	March 14, 1985	March 14, 1987
Dr. J.C. Madden President, Microtel Pacific Research Burnaby	July 15, 1981	July 15, 1984
Dr. G.A. May President, George May and Associates Sooke	July 28, 1983	July 28, 1985
Mr. D.F. Miller Corporate Director Vancouver	December 14, 1983	December 14, 1985
Dr. T.W. Pearson Department of Biochemistry and Microbiology, University of Victoria	December 3, 1981	December 14, 1985
Dr. G.W. Poling Head, Department of Mining and Mineral Process Engineering University of British Columbia	February 23, 1984	February 23, 1986
Mr. S.C. Rooney President, Durand Machinery Company Ltd. New Westminster	March 6, 1980	April 28, 1984
Dr. I.H. Warren, Technical Consultant, Research and Development, Chemetics International Vancouver	June 13, 1984	June 13, 1986
Mr. A.R. Williams Corporate Vice President, (Western Canada), Canadian National Vancouver	February 23, 1984	February 23, 1986

Research Secretariat of B.C. Staff (April 1984 – March 1985)

Dr. J.T. Sample	Executive Director
Dr. M.A. Cairns	Associate Director
Miss T.L. Bowyer	Receptionist/Secretary
Ms. P.K.P. Chau	Awards Officer (to October 31, 1984)
Mrs. M.G. Eickhoff	Secretary (B.C. HCRF)
Miss C.J. Graham	Research Officer (to August 31, 1984)
Mrs. P.A. McKeever	Secretary
Mr. D.G. McPherson	Accountant (part-time consultant)
Mr. K.R. McPherson	Innovation Coordinator (to November 30, 1984)
Mr. D.A. Rodger	Information Officer (part-time consultant)
Mr. R.W. Warner	Awards Officer (from December 10, 1984)
Mrs. M.L. Welsh	Grants Secretary (to August 31, 1984)
Dr. D.B. Whitney	Awards Officer (B.C. HCRF)

The year that ended on March 31, 1985 was one of the most significant in the history of the Science Council of British Columbia. It brought us disappointment, as Dr. Roy Nodwell was forced by illness to resign in February from his position as Chairman. (I am delighted to report that Dr. Nodwell has now recovered and continues to make a major contribution to science and technology in British Columbia!) It brought us change, as we moved from our offices in Richmond to new surroundings in the Multi-Tenant Building at Discovery Park in Burnaby. But most of all, the 1984-85 operating year brought us satisfaction!

Some of Our Successes

The dividends produced by the Science Council's grants and scholarship programs, funded by the Government of British Columbia, are now evident throughout the province. Science Council members past and present can point with pride to new companies, products and systems and to the expansion or improvement of existing ones that would not have occurred without their support. Here are just a few examples:

Seakem Oceanography in Sidney, B.C. received Science Council assistance to help it develop a portable water quality sampler. From research to prototype took less than three years. A new company, *Seastar Instruments*, has been formed to oversee sales and marketing, several new permanent jobs have already been created, fresh work has been provided for various sub-contractors in Victoria and on the Saanich peninsula, and sales of the instrument, at $10,000 apiece, have been brisk.

Now, *Seakem* has established an electro-optical division and, with additional Science Council support, is producing fibre-optics products and systems for a rapidly expanding market at the frontier of modern instrument technology.

MacDonald Dettwiler and Associates in Richmond has received Science Council help for a number of projects. These have included research relating to the processing of images sent to earth from satellites, that can aid in resource management in the forest sector, for example. Software development for a number of commercial products relating to this technology has created twenty-five new jobs.

The SpaceTel Communications System is being widely marketed and sold by the Burnaby-based firm, *Microtel*. Science Council funds have helped the company's research division develop some of the unique circuitry in the SpaceTel system. Three new jobs have been created as a direct result of discoveries made along the way and *Microtel Pacific Research* was able to establish itself in the forefront of microwave communications research. Potential sales from the system are estimated to be in the hundreds of millions of dollars a year, and the system will improve communications for people in remote locations throughout British Columbia, Canada and the world.

From the Chairman *cont.....*

The announcement in October that *Moli Energy Ltd.* was about to begin construction of a factory in Maple Ridge, where it would manufacture light-weight lithium molybdenum disulphide batteries, didn't come as a surprise to the Science Council. Since 1980, the Council has been a major supporter of the research that led to this exciting new product.

The company expects to have several hundred people working in the factory. Additional staff will be hired to produce the raw material at a plant in Kamloops, and the firm's research facilities in Burnaby are to be expanded.

From Science Council-supported research at both the University of British Columbia and Simon Fraser University has come a family of safe "chemical weapons" for use in the fight against ambrosia beetles and the damage they are doing to our forests. The "weapons" are safe because they are synthetic copies of the chemical attractants the insects use in the wild. Special devices that insure these "pheromones" are released at just the right rate, and traps that prevent the creatures from escaping, are additional products from this wide-ranging research.

A new company, *Phero Tech Inc.* in Vancouver, has been set up to produce the synthetic pheromones, the release devices and traps. Several new jobs have been established and sales revenue, much of it from customers outside B.C., is well over $100,000 per year.

Finally, in this tiny sample of the many successful Science Council projects, there is the case of the *A.T.S. Electrolube* system. Invented in Vancouver, the lubricator provides a steady flow of grease to the working parts of heavy machinery for periods of up to one year under a wide range of operating conditions. Problems with the electro-chemical pressure system that forces the lubricant out threatened to curtail sales of the device and throw several employees of the Delta, B.C. manufacturer out of work.

The problems were overcome thanks to research at the University of British Columbia, supported by the Science Council. Today, the lubricator is sold to customers all over the world, and annual sales are projected to reach millions of dollars per year!

Many other projects are advancing rapidly, thanks to Science Council support. In 1984-85, we awarded a total of $2,785,059 in two "competitions" to 62 research projects. Some of these are new ones; others are into their second or third years. At any rate, we expect to be able to provide an entirely new list of scientific and commercial successes in the next year's report!

Members of the Science Council

The fifteen members of the Science Council are appointed, normally for two-year terms, by the Minister of Universities, Science and Communications. They include distinguished scientists and engineers from the universities and research institutes as well as prominent executives from the world of business in British Columbia. In addition to Dr. Nodwell, retiring members in 1984-85 included Dr. J.F. Cochran, Dr. J.C. Madden and Mr. S.C. Rooney. Newly appointed were Dr. D.J. Connor, Dr. J.M. Dewey, Mr. B. Hodges, Dr. T.E. Howard, Dr. P.A. Larkin and Dr. I.H. Warren. Dr. Dewey,

Associate Vice President Academic for Research at the University of Victoria, and a founding member of the Science Council in 1978, was appointed Chairman in March, 1985.

The Secretariat on Science, Research and Developement

Science Council members volunteer their time while the ongoing administration of the grants programs and other important activities is managed by the Secretariat on Science, Research and Development, under the direction of Dr. J.T. Sample.

The Secretariat, with a full-time staff of seven, provides parallel services to both the Science Council and the British Columbia Health Care Research Foundation. It distributes information on the programs to potential applicants, reviews applications and constantly monitors the progress (and, sometimes the lack of it) of each researcher.

The Secretariat organizes the monthly meetings of the Science Council itself, as well as regular meetings of the Council's standing committees on Public Relations, Policy, Finance and Audit, the Scholarship and Fellowship Subcommittee, the Science and Engineering Awards Subcommittee and the nine special technical Review Subcommittees, whose members provide expertise in evaluating grant applications in the nine major subject areas: Agriculture and Food; Aquatic Sciences; Biotechnology; Electronics and Communications; Energy; Forests and Forest Products; Manufacturing and Machinery; Mining and Metals; and Transportation.

Also, during 1984-85, the Research Secretariat coordinated a study of the Computer Software Industry in B.C., oversaw the production of a major survey of the prospects for Aquaculture in the province and reviewed applications under the provincial government's "Hi-Tech Summer Student Job Program".

G.R.E.A.T. Scholarships

In addition to the program of applied research grants the Science Council and the Research Secretariat administer the GRADUATE RESEARCH, ENGINEERING AND TECHNOLOGY (G.R.E.A.T.) scholarship program. The G.R.E.A.T. scholarships are intended to encourage more interaction between the universities and the "real world" of the private sector.

These awards, the value of which was increased from $11,500 to $12,000 during the year, are made to students whose thesis research can be performed partly in an off-campus setting. This enables the students to gain experience of a more practical nature than is usually possible on the campus, while, at the same time, it encourages businesses, agencies and consulting firms to use university expertise to help solve some of their research problems.

There have been instances where a company has used a G.R.E.A.T. scholarship to send an employee back to university to work on a post-graduate degree, thereby bringing greater scientific research skills back to the company after graduation.

From the Chairman *cont.....*

Fifty one G.R.E.A.T. awards were made in 1984-85 to students from all over the province attending the three major universities. Of these, 27 were new awards and 24 were second or third year renewals.

Industrial Post-Doctoral Fellowships

The INDUSTRIAL POST-DOCTORAL FELLOWSHIP (I.P.D.F.) program has related objectives. It provides a salary subsidy of $25,000 to any British Columbia firm willing to hire a recent Ph.D. graduate in the sciences or engineering in jobs related to their training. Seven I.P.D.F.'s were awarded in 1984-85, to firms in Sidney, Langley, Richmond and Vancouver, and these have further contributed to some of the industrial developments mentioned previously.

B.C. Science and Engineering Awards

In an effort to recognize the contribution of science and technology to the development of the province and to create better public awareness of the achievements of our scientists and engineers, the Science Council provides the British Columbia Science and Engineering Awards. Each winner receives a gold medal and a handsome citation which are awarded at a dinner in October.

The 1984 winners were Dr. Suezone Chow and Dr. Gary Troughton, for their discovery of a new method for fast-drying the glue used to produce finger-jointed wood; Dr. Rudi Haering, for his general achievements in the field of battery research; and Dr. Michael Smith, whose research into the identification of specific genes has lead to new techniques in genetic engineering.

Other Activities

Throughout the year, the Science Council considered, as its mandate requires it to, a number of matters referred to it by the Minister or by other government agencies and organizations. For example, the Council met with representatives of the Open Learning Institute to discuss the Institute's plans for expanding its science programs. The Council also agreed to help the Minister select a British Columbia student who will attend the Canadian Centre for Creative Technology in Ontario.

The year also saw the end of the Science Council's direct involvement in the operation of the B.C. Innovation Office. The Council was instrumental in founding the Innovation Office in 1982 and, since then, the office has developed many programs to assist local innovators, inventors and industries. At the request of the Innovation Office, and with the concurrence of the Discovery Foundation, responsibility for the Innovation Office was transferred to the Foundation in December, 1984.

The Council has provided funds to the H.R. MacMillan Planetarium in Vancouver to help it pay for a consultant's study of its future options, given the arrival on the scene of the Expo Centre and its Omnimax Theatre and the Arts, Sciences and Technology Centre.

In April, a direct grant of $20,000 was made to the British Columbia School Trustees Association to make possible their "Science Spectrum" exhibit of students' science projects from across the province. The Science Council was recognized as a co-sponsor. Later in the year, the Council provided the Arts, Sciences and Technology Centre with a grant of $11,940 to help with its organization of regional

From the Chairman *cont.....*

science fairs in British Columbia.

For the second year in a row, the Science Council made a prize of a book available to the top Grade twelve science student in every participating school district in the province. Beginning in 1985, this program will be administered by the British Columbia Science Teachers Association, and the award has been expanded so that it will be possible for a book prize to be given out at every secondary school in all participating school districts.

A Personal Note

In conclusion, may I express my thanks to the efficient staff of the Research Secretariat who have continued to support the Science Council and the B.C. Health Care Research Foundation, often under difficult conditions, and the members of the Science Council and its Review Subcommittees, who have so willingly given their time, energy and wisdom for the benefit of British Columbia.

Dr. J.M. Dewey,
Chairman

Science Council of B.C.
Schedule of Research Grant Commitments
for the year ended March 31, 1985

1. Research Grant Competition #10 - (RC-10)

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
A. AGRICULTURE & FOOD		
Dr. Arthur A. Bomke (UBC, Soil Science)	The development of a seaweed (Macrocystis integrifolia) foliar spray for use in agricultural crop production.	20,000
Dr. James A. Shelford (UBC, Animal Science)	Use of silage additives to improve the quality of high moisture silages.	31,220
Dr. Roy L. Taylor (UBC, Botanical Garden)	P.I.S.B.G. (Plant Introduction Scheme of the Botanical Garden).	75,000
Dr. Philip M. Townsley (UBC, Food Science)	The continuous production of commercial mushrooms using liquid composts.	15,584
Dr. John M. Webster (SFU, Biological Sciences)	Commercial development of entomogenous nematodes to control certain insect pests of agriculture and forest nursery crops in B.C.	65,000
Dr. Mark L. Winston (SFU, Biological Sciences)	Development of a honeybee package and queen industry in B.C.	39,500
B. AQUATIC SCIENCES		
Mr. Bodo de Lange Boom (Seakem Oceanography Ltd., Sidney)	Development of an acoustic depth sensor	49,714
Dr. Hilda L. Ching (Envirocon Ltd., Vancouver)	Improvement of potential steelhead trout productivity by the use of disease-resistant stocks.	16,895
Mr. Roger J. Soar (Lambda Technology, Victoria)	Development and testing of an aquatic plant control device.	46,700

1. Research Grant Competition #10 - (RC-10) cont.....

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
C. ELECTRONICS & COMMUNICATIONS		
Dr. Richard F. Hobson (SFU, Computing Science)	On the feasibility of a ray tracing graphics engine.	10,259
Drs. Roy Morrison & Robert Frindt (SFU, Physics)	Investigation of semi-conductor gas sensors aimed at the development of new devices and improved utilization techniques in the design of low cost gas analysis systems.	3,872
Mr. William D. Thomas (H.A. Simons (Int'l) Ltd., Vancouver)	Application of land based analytical plotter technology as input to computer aided drafting and design systems for industrial redevelopment projects.	88,000
Mr. Larry S. Wasik et al (H.A. Simons (Int'l) Ltd., Vancouver)	Process simulator for operator training	125,000
D. ENERGY		
Dr. John Affinito (Corona Vacuum Coaters Inc. Vancouver)	Automated gas flow and power supplies for sputtering.	29,000
Dr. Boye Ahlborn (UBC, Physics)	Design, construction and testing of a two-stage, four cylinder compressor for natural gas.	18,600
E. FOREST & FOREST PRODUCTS		
Dr. John H. Borden (SFU, Biological Sciences)	Management of the mountain pine beetle with semiochemicals.	30,273
Mr. Ernest A. Hamm (Forintek Canada Corp., Vancouver)	Measurement of wood density by compression of increment cores.	12,986
Dr. Paul R. Steiner (Forintek Canada Corp., Vancouver)	Mill trials and foam development of modified plywood synthetic patching materials.	18,535
Dr. Ian E.P. Taylor (UBC, Botany)	Tissue culture and micropropagation of mature B.C. conifers.	54,225
Dr. Gordon F. Weetman (UBC, Forestry)	Arrested plantation development on coastal cedar/hemlock sites.	30,600

1. Research Grant Competition #10 - (RC-10) *cont.....*

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
F. MANUFACTURING & MACHINERY		
Mr. N.F. Duke (Target Products Ltd., Vancouver) and Mr. G.K. Gunnyon (Hardy & Associates (1978) Ltd., Burnaby)	1. Development of condensed silica fume technology for application in premixed, dry bagged and concrete products. 2. Continuing research to reduce temperature sensitivity of concrete repair materials.	20,000
Drs. Igor Mekjavic and David Goodman (SFU, Kinesiology)	Thermal protective wear for aircraft personnel: An investigation and evaluation.	50,000
Dr. Alan D. Russell (UBC, Civil Engineering)	Productivity improvement for the construction industry.	45,000
Dr. Peter Ward (Peter Ward & Assoc. Ltd., Vancouver)	Design and testing of drive system for solar-powered pumps.	38,000
G. MINING, MINERALS & METALS		
Dr. J.K. Brimacombe & Dr. I.V. Samarasekera (UBC, Metallurgical Engineering)	The development of new mould designs for continuous steel-billet casting machines.	42,000
Dr. J. Laskowski (UBC, Mining & Mineral Process Engineering)	Emulsifying reagents in the flotation of difficult-to-treat coals.	19,200
Prof. H.D.S. Miller (UBC, Mining & Mineral Process Engineering)	Tunnel simulation computer model.	15,750
Dr. Alastair J. Sinclair (UBC, Mechanical Engineering)	Quantitative models for exploration and evaluation of mineral deposits.	30,300
H. TRANSPORTATION		
Dr. S.M. Calisal (UBC, Mechanical Engineering)	Dynamic stability of small vessels.	39,700
	(RC-10:) TOTAL $ COMMITTED (1984-85) (29 PROJECTS)	$1,080,913

2. Research Grant Competition #11 - (RC-11)

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
A. AGRICULTURE & FOOD		
Dr. Robert Blair (UBC, Animal Science)	Improved vitamin allowances for weanling swine.	15,030
Dr. Kimberly M. Cheng (UBC, Poultry Science)	Improvement of breeding stock for efficient squab production in B.C.	21,350
Dr. J.E. Rahe (SFU, Biological Sciences)	Development of white rot-resistant commercial onion cultivar, and evaluation of *Brassica juncea* for biological/cultural control of white rot and as green manure cover crop.	23,826
Dr. J.S. Sim (UBC, Poultry Science)	Development of pigeon feed for squab in B.C. and characterization of pigeon milk.	18,212
B. AQUATIC SCIENCES		
Mr. Norman Gibbons (Redonda Sea Farms Ltd., Refuge Cove)	Scallop seed collection and growth in the Refuge Cove Area.	25,710
Dr. Brian Harvey/ Mr. Chris Denny (Baltic Eng. Ltd., Victoria)	Development and testing of a tranquilizing dart and injector for aquatic animals.	30,000
Mr. Tom W. Higgs (Sigma Resource Consultants Ltd., Vancouver)	Fermentation of whole fatty fish to produce a high quality protein product.	48,000
Mr. Gordon Jones (Innovative Aquaculture Products, Ltd., Sherry Bay)	Algae production and storage facility (phase two).	68,300
Mr. Thomas Shields (Archipelago Marine Research, Victoria.)	A proposal to utilize cultured kelps in the herring spawn-on-kelp fishery.	55,186

2. Research Grant Competition #11 - (RC-11) cont.....

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
C. ELECTRONICS & COMMUNICATIONS		
Dr. Thomas W. Calvert (SFU, Computing Science)	Computer assisted film and video production.	53,670
Dr. Joe L. Fikart (Microtel Pacific Research Ltd., Burnaby)	High gain, frequency agile, linearized upconverter for use in earth station transmitters in the 6 GHz and 14 GHz bands.	98,750
Mr. Daniel E. Friedmann (MacDonald Dettwiler and Associates Ltd.,Richmond)	An image analysis system - geographic information system interface (Phase II).	64,404
Mr. Daniel Gelbart (Creo Electronics Corp., Burnaby)	Development of an inertia-less read-servo for an optical tape recorder.	104,465
Dr. Richard Hobson (SFU Computing Science)	Very large scale integration computer design.	80,374
Dr. Ronald MacFarlane & Dr. Wolfgang Liese Seastar Instruments Ltd., Sidney)	Development of a fibre optic accelerometer.	96,037
Dr. S.O. Dennis Russell (UBC, Civil Engineering)	Computer software-development of a program generator.	67,100
Dr. Calvin Winter (Quantum Technology Corp., Surrey)	Closed-cycle liquid helium temperature (4.2K) cryocooler.	29,000
D. ENERGY		
Dr. Tad McGeer (SFU, Engineering Science)	Ignition timing controller for dual fuel engines.	28,000
Dr. Paul Watkinson (UBC, Chemical Engineering)	Drying of hog fuel.	19,584
E. FOREST & FOREST PRODUCTS		
Dr. Jan Axne (MacMillan Bloedel Research, Vancouver)	Rock and rot detection in logs.	77,100
Dr. Jan Brdicko (Catec Eng. Co. Inc., Burnaby)	Development of bandsaw thermal tensioning guides (BSTTG).	73,500
Dr. Fred L. Bunnell (UBC, Forestry)	Managing forest stands to supply wildlife needs.	89,610

2. Research Grant Competition #11 - (RC-11) cont.....

GRANT RECIPIENT & ORGANIZATION	PROJECT DESCRIPTION	TOTAL $ COMMITTED 1984-85
E. FOREST & FOREST PRODUCTS		
Mr. Bud Eyers (Talkie Tooter (Canada) Ltd., Vancouver)	Faller's emergency alarm.	46,490
Dr. James Kimmins (UBC, Forestry)	Development of a microcomputer simulation model for the prediction of lodgepole pine spacing responses in relation to site.	44,300
Dr. Staffan Lindgren (Phero Tech Inc., Vancouver)	New methods for manipulating populations of three bark beetles with semiochemicals.	33,910
Mr. Douglas E. Rickson (Canadian Forest Products, Vancouver)	Propagation of Douglas-fir, White spruce, Lodgepole pine and Yellow cedar plantlets using tissue culturing techniques.	52,297
Mr. Alex Sinclair (F.E.R.I.C., Vancouver)	Transmission of log truck weight to log loader.	60,150
Mr. D.C. Walser (Forintek Canada Corp., Vancouver)	Improving the performance of veneer cutting and waferizing knives.	25,678
F. MANUFACTURING & MACHINERY		
Dr. Frank Curzon (UBC, Physics)	Ultra-violet Vortek arc lamp.	52,000
Mr. Guy Immega (MacDonald Dettwiler & Associates Ltd., Richmond)	Robotic Muscle Actuator (ROMAC).	112,967
Drs. Roy Morrison, Konrad Colbow, Bruce Clayman (SFU, Physics)	Industrial testing of heat-reflecting window glass.	46,800
G. MINING, MINERALS & METALS		
Dr. Marcus Bell (UVIC, Biology)	Reclaiming coal mined lands in the Rocky Mountains with native nitrogen-fixing plants.	26,046
Dr. Harry Warren (UBC, Geological Sciences)	Thallium-A pathfinder for epithermal deposits.	16,300
	(RC-11): TOTAL $ COMMITTED (1984-85) (33 PROJECTS)	$1,704,146

G.R.E.A.T. Scholarships Awarded 1984-85

1. New Awards

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
K.P. Andrew	Dept. of Geological Sciences, UBC	Dr. C.I. Godwin	Rio Algom Exploration Inc., Vancouver
Douglas Bright	Dept. of Biology UVIC	Dr. D.V. Ellis	Island Copper Mine, Pt. Hardy
Derek A. Brown	Dept. of Geological Science, UBC	Dr. R.L. Armstrong	Westmin Resources Ltd., Vancouver
S.L. Cockroft	Dept. of Metallurgical Engineering, UBC	Dr. G. Richards/ Dr. J.K. Brimacombe	Cominco Ltd., Trail
B.D. Devlin	Dept. of Geological Sciences, UBC	Dr. C.I. Godwin	Dolly Varden Resources Ltd., Toronto
C.M. Dilucca	Dept. of Harvesting & Wood Science, Faculty of Forestry, UBC	Dr. J.W. Wilson	1) Fortntek Canada Corp. Vancouver 2) Ministry of Forests, Victoria
T.D. Durance	Dept. of Food Science, UBC	Dr. S. Nakai	Brookside Farms Ltd., Abbotsford
D.W. Egles	Dept. of Oceanography, UBC	Dr. P.H. Leblond	Seaboy Marine Services Ltd., Sidney
E.P. Groot	Dept. of Zoology, Institute of Animal Resource Ecology, UBC	Dr. T.G. Northcote	Pacific Biological Station, Nanaimo
R. Hamelin	Dept. of Biological Sciences, SFU	Dr. J.E. Rahe	Pacific Forest Research Centre, Victoria
V. Harris	Dept. of Microbiology, UBC	Dr. J.G. Levy	Quadra Logic Technologies, Vancouver
Winnifred Hays	Dept. of Geography, UVIC	Dr. G.M. Barber	1) MacMillan Bloedel Ltd. Nanaimo 2) Pacific Forest Research Centre, Victoria
K. Koenig	Dept. of Animal Science, UBC	Dr. J.A. Shelford	Agriculture Canada Research Station, Agassiz
K. Lertzman	Dept. of Forest Sciences, UBC	Dr. J.P. Kimmins	MacMillan Bloedel Ltd., Nanaimo

1. New Awards *cont...*

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
J.E. MacDonald	Dept. of Biology, UVIC	Dr. J.N. Owens	MacMillan Bloedel Ltd., Nanaimo
K. Mah	Dept. of Biological Sciences, SFU	Dr. F. Law	Canadian Forest Products Ltd., Vancouver
J.S. Mattison	Dept. of Civil Engineering, UBC	Dr. S.O.D. Russell	Sigma Engineering, Vancouver
R.N. Morrison	Dept. of Computer Science, UBC	Dr. P. Gilmore	Softwords Division, Press Porcepic Ltd., Victoria
E.T. Murray	Dept. of Forest Resource Management, UBC	Dr. P.J. Dooling	CIP Forest Products Inc., Victoria
R.D. Powell	Inst. of Animal Resource Ecology and Dept. of Plant Science, UBC	Dr. J. Myers	Ministry of Forests, Victoria
D.V.M. Soulodre	Dept. of Biological Sciences, SFU	Dr. W. Vidaver	Les Clay and Son Ltd., Langley
R.N. Stewart	Dept. of Biological Sciences, SFU	Dr. J.E. Ralve	Pacific Forest Research Centre, Victoria
I.P. Street	Dept. of Chemistry, UBC	Dr. S.J. Withers	Forintek Canada Corp., Vancouver
A.C. Thomas	Det. of Oceanography, UBC	Dr. W.J. Emery	G.A. Borstad Ltd., Sidney
D.R. Thomson	Dept. of Biological Sciences, SFU	Dr. B.D. Roitberg	1) B.C. Coast Vegetable Cooperative, Richmond 2) Agriculture Canada, Vancouver
C.G. Towill	Dept. of Civil Engineering, UBC	Dr. M.C. Quick	Amax of Canada Ltd., Vancouver
M.G. Walsh	Dept. of Poultry Science, UBC	Dr. B.E. March	Fisheries & Oceans Canada, Fisheries Resource Branch, Vancouver.

G.R.E.A.T. Scholarships Awarded 1984-85

1. Renewal Awards (Year 2)

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
J.R. Brown	Dept. of Biological Sciences, SFU	Dr. Brian Hartwick	1) B.C. Oyster Growers Assoc., Ladysmith 2) Ministry of Environment, Marine Resources Section, Victoria
M.P. Curran	Dept. of Soil Science, UBC	Dr. T.M. Ballard	MacMillan Bloedel Ltd., Nanaimo
M. Cuson	Dept. of Biological Sciences, SFU	Dr. B.D. Rottberg	1) B.C. Coast Vegetable Coop. Assoc., Richmond 2) Agriculture Canada, Vancouver
D.J. Furnell	Dept. of Zoology, UBC	Dr. D.J. Randall	Pacific Biological Station, Nanaimo
E. Gerencher	Dept. of Soil Science, UBC	Dr. L.M. Lavkulich	1) Envirochem Consultants, Burnaby 2) E.V.S. Consultants Ltd., North Vancouver
S.H. Hill	Dept. of Oceanography, UBC	Dr. Stephen Pond	Institute of Ocean Sciences, Sidney
J. Howie	Dept. of Civil Engineering, UBC	Dr. R.G. Campanella	Western Geosystems Inc., Surrey
R.D. Kathman	Dept. of Biology, UVIC	Dr. M.J. Ashwood-Smith	E.V.S. Consultants Ltd., Vancouver
F.G. Peabody	Dept. of Electrical Engineering, UBC	Dr. W.G. Dunford	Cetec Engineering Co. Inc., Burnaby
M. Peterson	Dept. of Geography, UVIC	Dr. S.E. Tuller	Pacific Forest Research Centre, Victoria
E.A. Power	Westwater Research Centre & Faculty of Forestry, UBC	Dr. T.G. Northcote	Houston Forest Products, Houston
J. Reimer	Dept. of Electrical Engineering, UBC	Dr. P.D. Lawrence	Robotic Systems Int'l. Ltd., Victoria
A.W.Y. Shing	Dept. of Civil Engineering, UBC	Dr. S.F. Stiemer	Coast Steel Fabricators Ltd., Port Coquitlam

1. Renewal Awards (Year 2) cont...

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
A. Spruit-Ros	Dept. of Biology, UVIC	Dr. A. Austin	Min. of Environment, Waste Management Branch, Victoria
D. Tilden	Dept. of Metallurgical Engineering, UBC	Dr. F Weinberg & Dr. I.V. Samarasekara	Cominco Ltd., Trail
G.A. Waldie	Dept. of Poultry Science, UBC	Dr. J.S. Sim	Vancouver Island Mountain Squab Farm, Lantzville

2. Renewal Awards (Year 3)

NAME OF STUDENT	UNIVERSITY & DEPARTMENT	NAME OF ACADEMIC SUPERVISOR	NAMES OF COOPERATING ORGANIZATIONS
W. Cochlan	Depts. of Botany & Oceanography, UBC	Dr. P.J. Harrison	Institute of Ocean Sciences, Sidney
P.G. Comeau	Dept. of Forest Science, UBC	Dr. J.P. Kimmins	Crestbrook Forest Industries, Cranbrook
D.G. Gillespie	Dept. of Civil Engineering, UBC	Dr. R.G. Campanella	Thurber Consultants Ltd., Vancouver
W.A. Price	Dept. of Soil Science UBC	Dr. L.M. Lavkulich	Amax of Canada Ltd., Vancouver
F.M.G.A. Salgado	Dept. of Civil Engineering, UBC	Dr. P.M. Byrne	Golder Associates, Vancouver
C.D. Scott	Dept. of Biological Sciences, SFU	Dr. M.L. Winston	Okanagan Valley Pollination Association, Vernon
M.H. Stanhope	Dept. of Biological Sciences, SFU	Dr. E.B. Hartwick	MacMillan Bloedel Ltd., Nanaimo
F.E. Williams	Dept. of Biological Sciences, SFU	Dr. R.A. Robinson	C.I.P. Forest Products Ltd., Saanichton

Industrial Post Doctoral Fellowships Awarded 1984-85

1. New Awards

AWARD RECIPIENT	EMPLOYING COMPANY
Dr. T.F. Guthrie	Norwest Soil Research Inc., Langley
Dr. M.C. Hamilton	Seakem Oceanography Ltd., Sidney
Dr. D.J.J. Liu	Quadra Logic Technologies Inc., Vancouver
Dr. W. Liese	Seastar Instruments Ltd., Sidney

2. Renewal Awards

AWARD RECIPIENT	EMPLOYING COMPANY
Dr. M.J. Gnatowski	Industrial Science Laboratory, Richmond
Dr. S. Lindgren	Phero Tech Inc., Vancouver
Dr. G.A. Rivett	Diachem Industries Ltd., Richmond

AUDITORS' REPORT
TO THE MINISTER OF UNIVERSITIES,
SCIENCE AND COMMUNICATIONS

We have examined the balance sheet of The Science Council of British Columbia and Secretariat on Science, Research and Development as at March 31, 1985 and the statements of research appropriations, expenditures and unexpended appropriations and operations appropriations, expenditures and unexpended appropriations for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Council and Secretariat as at March 31, 1985 and the results of their operations for the year then ended in accordance with generally accepted accounting principles, as modified by note 1 to the financial statements, applied on a basis consistent with that of the preceding year.

Coopers & Lybrand

Vancouver, B.C.
May 17, 1985

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
BALANCE SHEET AS AT MARCH 31, 1985

ASSETS

	1985 $	1984 $
Cash and Short-Term Deposits	3,103,822	3,913,513
Accounts Receivable	43,315	40,553
Prepaid Expenses	1,611	4,339
	3,148,748	3,958,405

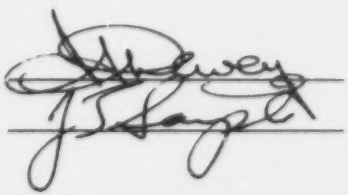
LIABILITIES

Accounts Payable and Accrued Liabilities	44,151	53,801

UNEXPENDED APPROPRIATIONS

Research (Note 2)	3,055,659	3,809,585
Operations	48,938	95,019
Commitments (Note 2)	3,104,597	3,904,604
	3,148,748	3,958,405

Approved by the Council and Secretariat



THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
STATEMENT OF RESEARCH APPROPRIATIONS, EXPENDITURES
AND UNEXPENDED APPROPRIATIONS
FOR THE YEAR ENDED MARCH 31, 1985

	1985 $	1984 $
RESEARCH APPROPRIATIONS		
Grants from the Province of British Columbia	3,200,000	3,660,725
Interest	382,103	437,823
Other	10,344	
	3,592,447	4,098,548
RESEARCH EXPENDITURES		
Direct expenses and other	5,070	1,608
Graduate Research Engineering And Technology (GREAT) awards (see Schedule)	609,481	511,458
Grants (see Schedule)	3,339,132	4,294,747
Honoraria	4,800	7,800
Industrial Post-Doctoral Fellowships (IPDF) (see Schedule)	162,500	53,125
Public events		31,636
Science and Engineering awards	12,016	14,858
Special requests (see Schedule)	184,184	237,401
Special projects (see Schedule)	29,190	75,116
	4,346,373	5,227,749
EXCESS OF EXPENDITURES OVER APPROPRIATIONS FOR THE YEAR	(753,926)	(1,129,201)
UNEXPENDED APPROPRIATIONS - BEGINNING OF YEAR	3,809,585	4,938,786
UNEXPENDED APPROPRIATIONS - END OF YEAR (encumbered by outstanding commitments) (note 2)	3,055,659	3,809,585

THE SCIENCE COUNCIL OF BRITISH COLUMBIA AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
STATEMENT OF OPERATIONS APPROPRIATIONS, EXPENDITURES AND UNEXPENDED APPROPRIATIONS
FOR THE YEAR ENDED MARCH 31, 1985

	1985	1984
	$	$
OPERATIONS APPROPRIATIONS		
Grants from the Province of British Columbia	249,700	355,847
Interest	8,488	10,773
	258,188	366,620
EXPENDITURES		
Computer services	3,750	3,009
Consulting fees	630	1,629
Furniture and equipment	22,986	4,582
Information services	3,203	15,644
Leasehold improvements	5,873	
Meetings	2,290	1,810
Moving	5,473	
Personnel recruitment	840	
Photocopying and printing	19,402	24,442
Postage and courier	4,553	7,841
Professional fees	5,898	8,585
Publications	895	1,285
Rent	46,718	53,572
Salaries and employee benefits	278,765	316,348
Stationery and supplies	2,877	3,769
Telephone	10,710	12,307
Travel	9,371	15,702
	424,234	470,525
Other		
British Columbia Computer Industry Software Study		50,000
	424,234	520,525
RECOVERY OF EXPENDITURES		
British Columbia Health Care Research Foundation	106,456	59,046
British Columbia Innovation Office	12,393	
British Columbia Computer Industry Software Study		50,000
Other	1,116	7,352
	119,965	116,398
EXCESS OF EXPENDITURES OVER APPROPRIATIONS FOR THE YEAR	(46,081)	(37,507)
UNEXPENDED APPROPRIATIONS - BEGINNING OF YEAR	95,019	132,526
UNEXPENDED APPROPRIATIONS - END OF YEAR	48,938	95,019

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
NOTES TO FINANCIAL STATEMENTS
FOR THE YEAR ENDED MARCH 31, 1985

1. ACCOUNTING POLICIES

Fixed Assets

Fixed assets are not capitalized and depreciated as assets of the Council and Secretariat, but are written off in the period in which they are purchased.

Research Grants

Outstanding research grant commitments are conditional on receipt of satisfactory progress reports and are not recorded until actually disbursed.

2. RESEARCH GRANT COMMITMENTS (see Schedule)

During the year, the Council approved funding for research projects, awards, special requests and special projects totalling $3,670,546. At March 31, 1985, known outstanding commitments totalled $2,929,431 which, together with additional estimated renewed commitments for the year ending March 31, 1986 of $1,824,890, amount to $4,754,321 in known and estimated outstanding commitments.

The Council continued with an agreement whereby it shared certain costs associated with The B.C. Innovation Office with The Discovery Foundation until November 30, 1984, after which The Discovery Foundation took over the administration of the project. The council transferred $34,731 to The Discovery Foundation, being the balance of funds which had been committed for the operation of the Innovation Office.

3. PUBLIC INFORMATION

During the year, the Council spent $28,876 on public information activities. An amount of $12,000 is committed for the production costs of a brochure in the next fiscal year.

THE SCIENCE COUNCIL OF BRITISH COLUMBIA
AND SECRETARIAT ON SCIENCE, RESEARCH AND DEVELOPMENT
SCHEDULE OF COMMITMENTS AND DISBURSEMENTS OF SCIENCE COUNCIL RESEARCH GRANTS
FOR THE YEAR ENDED MARCH 31, 1985

	Known outstanding commitments beginning of year $	Additional commitments during year $	Disbursed during year $	Known outstanding commitments end of year $	Estimated renewed commitments in 1985 - 1986 $	Known and estimated outstanding commitments at March 31, 1985 $
RESEARCH GRANTS						
Research Competition #1	4,450		4,450			
Research Competition #2	28,453		25,453	3,000		3,000
Research Competition #3	75,042	(8,414)	38,138	28,490		28,490
Research Competition #4	113,811	(3,680)	29,619	80,512		80,512
Research Competition #5	105,827	(1,420)	23,582	80,825		80,825
Research Competition #6	167,616	(1,909)	67,745	97,962		97,962
Research Competition #7	816,401	(31,973)	500,366	284,062		284-062
Research Competition #8	798,641	(20,189)	590,957	187,495		187,495
Research Competition #9	1,285,564	(88)	952,652	332,824		332,824
Research Competition #10		1,074,041	526,030	548,011	752,244	1,300,255
Research Competition #11		1,704,146	580,140	1,124,006	588,646	1,712,652
	3,395,805	2,710,514	3,339,132	2,767,187	1,340,890	4,108,077
AWARDS						
GREAT's		609,481	609,481		384,000	384,000
IPDF's	87,500	168,750	162,500	93,750	100,000	193,750
	87,500	778,231	771,981	93,750	484,000	577,750
SPECIAL REQUESTS						
Arts, Science and Technology Centre - Youth Fairs		11,940	10,746	1,194		1,194
B.C.S.T.A. Book Prize		10,000		10,000		10,000
Innovation Co-ordinator	73,438		73,438			
MacDonald Dettwiler - ROMAC		40,000	27,000	13,000		13,000
H.R. MacMillan Planetarium	1,300			1,300		1,300
Methane Energy Development Office		53,000	53,000			
Science Showcase	20,000		20,000			
	94,738	114,940	184,184	25,494		25,494
SPECIAL PROJECTS						
Project Review Program		31,000		31,000		31,000
Public Information		40,876	28,876	12,000		12,000
Schools' Book Prize	5,329	(5,015)	314			
	5,329	66,861	29,190	43,000		43,000
	3,583,372	3,670,546	4,324,487	2,929,431	1,824,890	4,754,321